

We claim:

1. A biomimetic gelation system comprising:
a polymeric component conjugated to at least one acyl donor peptide,
wherein at least one of each said peptides comprises at least two contiguous
glutaminy residues;
a polymeric component conjugated to at least one acyl acceptor peptide,
wherein at least one of each said peptides comprises a lysine residue; and
a transglutaminase.
2. The system of claim 1 wherein said acyl donor peptide comprises two to
about five glutaminy residues.
3. The system of claim 2 wherein said peptide comprises a DOPA residue.
4. The system of claim 3 wherein at least one of said glutaminy residues is
glutamine.
5. The system of claim 1 wherein said acyl acceptor peptide comprises a
residue selected from leucine and phenylalanine adjacent said lysine residue.
6. The system of claim 5 comprising a DOPA residue adjacent one of said
leucine and phenylalanine residues.
7. The system of claim 1 wherein said acyl donor peptide and said acyl
acceptor peptide are conjugated to one polymeric component.
8. The system of claim 1 wherein said acyl donor peptide is conjugated to a
first polymeric component and said acyl acceptor peptide is conjugated to a second
polymeric component.
9. The system of claim 8 wherein at least one of said first and second
polymeric components comprises poly(ethylene glycol).
10. The system of claim 9 wherein each of said first and second polymeric
components is conjugated to a plurality of said peptides.
11. The system of claim 8 wherein said first and second polymeric
components are selected from a poly(ethylene glycol), chitosan, collagens, hyaluronic
acid, alginic acid and albumins, and salts of said acids.

12. The system of claim 1 wherein said transglutaminase is isolated from guinea pig liver.

13. The system of claim 1 wherein said transglutaminase is a bacterial enzyme.

14. A method of using a biomimetic peptide for enzymatic gelation, said method comprising:

providing a first peptide having acyl donor activity, said first peptide comprising at least two contiguous glutaminyl residues and conjugated to a polymeric component;

providing a second peptide having acyl acceptor activity, said second peptide comprising a lysine residue; and

contacting a tissue transglutaminase with said first and second polymer-conjugated peptides and for a time at least partially sufficient for gelation.

15. The method of claim 14 wherein said first peptide comprises two to about five contiguous glutaminyl residues.

16. The method of claim 15 wherein at least one of said glutaminyl residues is glutamine.

17. The method of claim 16 wherein said first peptide further comprises a DOPA residue.

18. The method of claim 14 wherein said second peptide comprises less than about 20 amino acid residues and said lysine residue is the second residue from the C-terminal of said peptide.

19. The method of claim 18 wherein said second peptide further comprises a residue selected from leucine and phenylalanine adjacent to said lysine residue.

20. The method of claim 19 wherein said second peptide comprises a DOPA residue adjacent one of said leucine and phenylalanine residues.

21. A cross-linked hydrogel compound comprising the enzymatic acyl transfer product of an acyl acceptor polymer-peptide conjugate of a formula AC-PEG-AC and an acyl donor polymer-peptide conjugate of a formula $H_{4-n}C-(PEG-AD)_n$,

wherein AC is at least one acyl acceptor peptide, AD is at least one acyl donor peptide, and n is an integer from 1-4.

22. The hydrogel compound of claim 21 wherein said acyl acceptor PEG component comprises two terminal lysine residues, each said residue coupled to at least one AD peptide.

23. The hydrogel compound of claim 21 wherein n is 4 in said acyl donor conjugate.

24. The hydrogel compound of claim 21 wherein each of said acyl donor peptides comprises two to about five contiguous glutaminy residues.

25. The hydrogel compound of claim 24 wherein at least one of said glutaminy residues is glutamine.

26. The hydrogel compound of claim 25 wherein said acyl donor peptide further comprises a DOPA residue.

27. The hydrogel compound of claim 26 wherein said acyl donor peptide comprises DOPA-GQQQLG.

28. The hydrogel compound of claim 21 wherein each of said acyl acceptor peptides comprises less than about 20 amino acid residues and lysine is one residue from the C-terminal of said peptide.

29. The hydrogel compound of claim 28 wherein each of said acyl acceptor peptides further comprises a residue selected from leucine and phenylalanine adjacent to said lysine residue.

30. The hydrogel compound of claim 29 wherein said acyl acceptor peptide is selected from KG, FKG and LKG, and N-terminal acetylated derivatives thereof.

31. The hydrogel compound of claim 29 wherein said acyl acceptor peptide further comprises a DOPA residue.

32. The hydrogel compound of claim 31 wherein said acyl acceptor peptide is selected from DOPA-FKG and DOPA-LKG.

33. A cross-linked hydrogel compound comprising the enzymatic acyl transfer product of an alginic acid conjugated to at least one acyl acceptor peptide,

said acyl acceptor peptide comprising at least one lysine residue, and a poly(ethylene glycol) conjugated to at least one acyl donor peptide, said acyl donor peptide comprising at least two contiguous glutaminy residues.

34. The hydrogel compound of claim 33 wherein each of said acyl donor peptides comprises two to about five contiguous glutaminy residues.

35. The hydrogel compound of claim 34 wherein at least one of said glutaminy residues is glutamine.

36. The hydrogel compound of claim 35 wherein said acyl donor peptide further comprises a DOPA residue.

37. The hydrogel compound of claim 33 wherein each of said acyl acceptor peptides comprises less than about 20 amino acid residues and lysine is at least one residue from the C-terminal of said peptide.

38. The hydrogel compound of claim 37 wherein each of said acyl acceptor peptides further comprises a residue selected from leucine and phenylalanine adjacent to said lysine residue.

39. The hydrogel compound of claim 38 wherein said acyl acceptor peptide further comprises a DOPA residue.